

Traumatic dental injuries as reported during school hours in Bergen

Marit S. Skeie¹, Trine Evjensvold²,
Thu Hue Hoff², Asgeir Bårdsen¹

¹Department of Clinical Dentistry, Faculty of Medicine and Dentistry, University of Bergen, Norway; ²Former dental students at Department of Clinical Dentistry, Faculty of Medicine and Dentistry, University of Bergen, Norway

Key words: Traumatic dental injuries; guidelines; schools

Correspondence to: Marit S. Skeie,
Department of Clinical Dentistry, Faculty of
Medicine and Dentistry, University of Bergen,
Årstadveien 19, N-5009 Bergen, Norway
Tel.: +47 55586576
Fax: +47 55586568
e-mail: marit.skeie@iko.uib.no

Accepted 30 August, 2014

Abstract – Aims: To identify existing guidelines for managing traumatic dental injuries (TDIs) in the schools of Bergen, to ascertain the frequency of occurrence of such injuries, and to estimate the need for further information among teachers and school administrators. **Material and methods:** The study, undertaken among teachers and school administrators of elementary and lower secondary schools in Bergen municipality, was questionnaire-based and included a cross section of staff. The structured short questionnaire included items registering TDIs during 2009, existence of routines or guidelines for managing TDIs, previous relevant training, and request for TDI education or information. The statistical methods included frequency tables and logistic regression analysis. **Results:** The response rate was 73%. The incidence proportion of TDIs was measured to 0.74% of children at risk, varying according to children's classes (peak at third class: 1.68% of children in the population). No schools had adequate written guidelines for handling TDIs. Previous education on the subject was scarce. In 20 schools, there was no perceived need for TDI-related education or information. The schools' routines for TDI reporting, who was in charge of the reporting, acquired TDI education and expressed need for TDI information or education, did not influence the number of reported TDI cases. **Conclusion:** This study has produced reliable information that schools in the municipality of Bergen could improve ways of reporting and managing TDIs. As teachers with skills in handling TDIs could help to improve the prognosis for injured teeth, some types of educational intervention in schools should be launched.

Introduction

Epidemiological studies have proved traumatic dental injuries (TDIs) to be a worldwide phenomenon and, due to many reasons, TDI seems to be under-registered (1). The prevalence of TDIs in Scandinavia during the past three decades has been stable, estimated to be around 20–25% in permanent teeth among children and adolescents (2, 3). The incidence in children is, in most studies, in the range 1–3% in the population (1, 4) with a peak at the age of 12 years (5). Hence, schoolchildren constitute a group at risk of TDIs.

In Scandinavia, as in other industrialized parts of the world, children spend more and more time at school, day-care institutions and other organized activities. A literature review from 2008 concerning epidemiology of TDIs suggests that the activities of a person and the environment are more predictive for TDIs than sex and age (3). Registrations of TDIs during a one-year period (1992–1993) among 7 to 18-year-olds showed a slight predominance of injuries during school hours (6).

A study undertaken in selected parts of Norway in 2006 (7) revealed poor knowledge and awareness of TDIs among present and prospective teachers. It also documented that information on managing TDIs in schools and educational institutions was scarce and

that prospective teachers had not learnt about TDIs in their curriculum. During recent years, poor knowledge related to handling of TDIs among school teachers has been discussed by many authors (8–10), and it has been concluded that many teachers are unable to provide adequate emergency dental care (3).

As TDIs have physical, psychosocial, and economic consequences (direct and indirect cost), quality of life may also be reduced (11, 12).

Prompt and proper TDI emergency management is of great importance to secure the best possible long-term prognosis. This means that to reduce the sequelae and unnecessary suffering from TDIs, individuals close to the accident should have knowledge of how to manage TDI events, so teachers, other school staff, and coaches are key personnel. Poor knowledge of TDIs among school staff may entail under-registration of trauma episodes in school hours. As far as we know, the incidence of TDIs exclusively during school hours has not been investigated.

The main aims of this study were to evaluate existing routines and guidelines related to TDIs and to register the number of reported TDI episodes in school settings, in schools in Bergen (Norway). Additional aims are to map needs for improvement of existing TDI routines at schools and to reveal any requests for education of school staff related to handling of TDIs.

Material and methods

This questionnaire study was undertaken among teachers and school administrators, working at elementary and lower secondary schools in Bergen. Some of the school staff had previously participated in a study to evaluate their knowledge and awareness of TDIs (7). In Norway, municipalities are responsible for schools for children from first to tenth class (ages 6–15 years). The Bergen Department for Education and its Section for Schools and Kindergarden were contacted for permission, which was granted. From an online list of schools in Bergen, we extracted contact details. Altogether, 95 schools were on the list. As two schools were closing down, the study eventually comprised 93 schools: 62 elementary schools (class 1–7), 18 lower secondary schools (class 8–10), 12 combined elementary and lower secondary, and one school with children from fifth to seventh classes only. All schools for children up to fourth class had day-care facilities for children before and after school hours.

The procedure

All school principals received information, a questionnaire and a request to provide information about routines or guidelines for the handling of TDIs. Participation was anonymous and voluntary. Letters were sent in April 2010 and reminders in May 2010.

The questionnaire

The structured, closed-ended questionnaire on one page had nine items. The first five items concerned responsibility for registering TDIs, the number of reported cases in 2009, and the number of serious injuries such as avulsion reported. A limitation of the design was that cases of TDIs and children suffering from TDIs were not differentiated, implying that some children could be registered for more than one TDI episode. The last four items explored whether school staff had had training in handling TDIs, if there was a need for such training, and what kind of training would be chosen. Open-ended items were also included, to allow respondents to provide more detail.

Construction of variables

Variables were constructed for logistic regression analysis. Dependent variable was 'school's level of TDI reporting' (high: >3 cases = 1, low: ≤3 cases = 0). Independent variables were 'perceived routines for TDI reporting', 'type of personnel in charge of TDI reporting', 'some form for TDI education', and 'expressed need for TDI information/education'.

Statistical methods

Data management and analyses were undertaken using SPSS, version 17.00 (SPSS Inc., Chicago, IL, USA). All returned questionnaires were coded before entering the database. The incidence proportion was calculated

as the number of new TDI cases divided by the persons at risk (total number of pupils in the respective schools of Bergen) during the year 2009. Chi-square tests were used to test for statistically significant differences in categorical variables. Logistic regression models were used to investigate associations between independent variables and the dependent variable. Both bivariate and multiple forward stepwise analyses were carried out, and provided odds ratios (ORs) with 95% confidence intervals (CIs).

Results

Staff at 68 schools replied to the questionnaire; 42 elementary schools, 15 lower secondary schools, 10 combined elementary and lower secondary, and one school with children only from fifth to seventh class, a response rate of 73%.

Routines related to TDI

The majority (54%) of schools responded that they did not have any written routines for the handling of TDIs. Of the 30 schools reporting that they had written guidelines, 17 returned examples of such information. The information on routines consisted of National Insurance Scheme/The Norwegian Labour and Welfare Service (NAV) advice ($n = 6$) and schools' own claim advice sheets for registering general injuries ($n = 12$). None of the schools had adequate written guidelines. Furthermore, no school sent information, routines or guidelines about managing avulsed teeth. Table 1 presents an overview of the persons responsible for reporting TDIs.

Reported TDI

A total of 154 TDIs were reported by school personnel during the year 2009 (mean cases per class: 15.4, SD: 11.4). The occurrence of new traumatic dental injuries as reported by schools in Bergen, 2009 (Table 2), was highest from first to third class (1.36, 1.49, and 1.68 cases, respectively). Avulsion of teeth was reported by four schools, and the total number of cases was five and no case of avulsion was reported from lower secondary schools. The peak time for TDIs was during school breaks (Table 3). Five schools did not report where or when TDIs took place.

Table 1. School personnel responsible for reporting traumatic dental injuries (TDIs) at schools

	Number of schools	%
Secretary	29	42.0
Principal	19	27.5
Consultant	10	15.9
Teacher in charge of the class	4	5.8
Vice-principal	3	4.3
Other ¹	3	4.3
Total	68	100.0

¹Leader or persons at the site of accident.

Table 2. The occurrence of new traumatic dental injuries (TDIs) as reported by the schools in Bergen, 2009

Class/grade	Number of reported TDIs	Number of pupils (population at risk)	Incidence (% of new TDIs in the population at risk)
1st	28	2057	1.36
2nd	29	1949	1.49
3rd	32	1905	1.68
4th	15	1883	0.80
5th	18	2000	0.90
6th	14	2021	0.69
7th	11	1995	0.55
8th	4	2305	0.17
9th	1	2356	0.04
10th	2	2305	0.09
Total	154	20 776	0.74

Table 3. Place and time new traumatic dental injuries (TDIs) as reported by the schools in Bergen, 2009 (3 cases of unknown cause not reported)

	Number of TDIs	%
On the way to school	5	3.3
In class room	5	3.3
During school breaks	91	60.3
During gym period	23	15.2
During time at the SFO ¹	18	11.9
Other ²	9	6.0
Total	151	100.0

¹After-school activity program.
²Activity day (skiing or other activity outside the school grounds).

Education in handling TDIs

Education in handling TDIs was scarce and had taken place in any form in just nine schools. Employees in three of these nine schools had received information in a general first-aid course which was not focused on TDIs. Three schools reported having received some information on the topic from a school authority or by phone from a dentist. The last four schools did not report what kind of education they had received. A total of 45 schools reported willingness to receive more education and information about TDIs, but staff in 20 schools perceived no need for such education or information. Three schools did not respond to this question. The preferences types of education at the 45 schools seeking more information are presented in Table 4.

Bivariate and multivariate regression analyses conducted to reveal any impact of independent background variables on the dependent variable school's level of TDI reporting TDI¹, showed no significant associations. The schools' routines for TDI reporting, the personnel in charge of the reporting, TDI education acquired and an expressed need for TDI information or education, had no influence on the number of reported TDIs.

Discussion

This study was a follow up to an earlier Norwegian study (7) among teachers in selected schools, that

Table 4. Preferences for types of education related to management of traumatic dental injuries as reported by 45 schools in Bergen providing information and education on this topic

	Number of schools (%)
Brochures/information material	36 (80.0)
Lectures/seminars	2 (4.4)
Both information material and lectures/seminars	7 (15.6)
Total	45 (100.0)

documented low awareness and knowledge related to TDIs among teachers. While the former study investigated knowledge and awareness among teachers, the present study from the municipality of Bergen was carried out on school level. Unfortunately, the results from the present study support findings from the former study concerning lack of guidelines available for the teachers when needed. Additionally, willingness to participate in education about TDIs was not uniformly positive for all schools. At first glance, the reported occurrence of TDIs was low.

On a national basis, this was the first study of the occurrence of TDIs in permanent dentition since 1992–1993, and the first one in Western Norway. The response rate achieved was 73%, considered to be good for a questionnaire study. The sample was therefore considered representative for the city of Bergen.

The TDI incidence proportion reported by school personnel was in line with the literature, highest in the youngest schoolchildren with a peak in third classes (8 to 9-year-olds) (4). The overall incidence proportion reported was 0.7% of children in the population (6 to 15-year-olds). It is known from former studies that approximately half of the TDIs occur during school hours (6, 13). Hence, it is likely that our reported incidence from school hours represents half of the total incidence. In Norway and Sweden, incidence studies from similar age groups have been found to be 1.8% (4) and 1.5% (5), respectively. Thus, the incidence proportion of TDIs reported by schools in Bergen is within the expected range. Although the present study was performed almost two decades later, there were no indications in the available literature of any reduction in TDIs over these years (2). In the 1992–93 registrations in the previous Norwegian study, the individuals were a bit older, and those in charge of the TDI registration were dentists working in the Public Dental Service, not school staff. In most participating schools, it was the secretary or the principal who administered the registrations. An advantage in the previous study was that injured teeth were only registered once. The present study design could not guarantee that all individuals had only one trauma episode.

Not unexpectedly, the majority of TDIs during school hours took place in school breaks and gym periods. Some injuries in children up to fourth class occurred during leisure activities in the school area. Only four schools reported avulsions (total five cases). Avulsions require a certain amount of mechanical energy. This low number of avulsions may be due to the regulations concerning playgrounds for children

(14), which are intended to protect against dental (and other) traumas in playgrounds (15). Among children up to 14 years of age, cycling after school hours clearly constitutes a higher avulsion risk (16).

It can be concluded from the present study that knowledge related to handling of TDIs was not seen upon as a priority for school staff. A cause for concern is that a considerable number of schools reported that they did not have any need of more education in the field. This suggests ignorance of the importance of emergency management of TDIs. This low awareness of TDIs might have led to under-reporting of the number of TDIs.

The findings of the present study from the municipality of Bergen fit into the body of literature on the subject, both in respect to the expected number of new TDI cases per year during school hours and in respect to the low priority on emergency management of TDIs in schools.

Training for dental emergencies has sporadically been included in the teachers' school health education program (17), but the management of TDIs in medical courses and first-aid training is usually not dealt with. Further, the information related to handling of TDIs in first-aid textbooks and manuals is in generally scarce and poor (18). Nevertheless, a recent literature search by Young et al. (19) on the topic of education for teachers in handling TDIs has shown that some educational programs carried out by dental health personnel were effective. Seminars, lectures, leaflets, pamphlets, banners, and posters were among the methods used. Educational posters, displayed for 2 weeks, on TDI knowledge were especially found to be effective. Long-term displays in schools should therefore be considered as a feasible option.

The 21st century has opened up for new trends in health promotion using consumer health informatics and eHealth (20). This trend includes oral health promotion, including prevention and care of TDIs. Internet home pages (e.g., [http://www.dentaltraumaguide.org/dental trauma guide](http://www.dentaltraumaguide.org/dental%20trauma%20guide)) are easily accessible and give updated first-aid information for dental trauma. The medical app 'Dental Trauma - first aid' (<https://itunes.apple.com/us/app/dental-trauma/id527527459?mt=8>) is another device of modest cost, developed to give emergency instruction to personnel at the accident site. The question is how many school personnel are aware of these opportunities.

Services available at Internet, wireless media such as web-compatible mobile phones, and different types of apps present vast opportunities, but also challenges (20). Beyond doubt there is a need for more research focusing how effective such types of information resource are, and not to forget, to investigate if they can deliver safe and evidence-based patient choice.

Conclusion

This study has produced reliable evidence that schools in the municipality of Bergen could improve the way they report and manage TDIs. As teachers with skill in

handling TDIs could help to improve the prognosis of injured teeth, some educational interventions in schools should be launched.

Future research

An initial suggestion is to encourage the spread of the medical app 'Dental Trauma - first aid', and later to evaluate its effectiveness on emergency management of dental trauma.

Acknowledgement

The authors wish to thank the participating teachers and school administrators.

Conflict of interest

The authors declare that they have no competing interests.

References

1. Glendor U, Marcenes W, Andreassen JO. Classification, epidemiology and etiology. In: Andreassen J, Andreassen F, Andersson L, editors. Textbook and color atlas of traumatic injuries to the teeth, 4th edn. Copenhagen: Blackwell Munksgaard; 2007. p. 217–54.
2. Andersson L. Epidemiology of traumatic dental injuries. *J Endod.* 2013;39:2–5.
3. Glendor U. Epidemiology of traumatic dental injuries - a 12 year review of the literature. *Dent Traumatol* 2008;24:603–11.
4. Skaare AB, Jacobsen I. Dental injuries in Norwegians aged 7–18 years. *Dent Traumatol* 2003a;19:67–71.
5. Glendor U, Halling A, Andersson L, Eilert-Petersson E. Incidence of traumatic tooth injuries in children and adolescents in the county of Västmanland, Sweden. *Swed Dent J* 1996;20:15–28.
6. Skaare AB, Jacobsen I. Etiological factors related to dental injuries in Norwegians aged 7–18 years. *Dent Traumatol* 2003b;19:304–8.
7. Skeie MS, Audestad E, Bårdsen A. Traumatic dental injuries - knowledge and awareness among present and prospective teachers in selected urban and rural areas of Norway. *Dent Traumatol* 2010;26:243–7.
8. McIntyre JD, Lee JY, Trope M, Vann WF Jr. Elementary school staff knowledge about dental injuries. *Dent Traumatol* 2008;24:289–98.
9. Al-Asfour A, Andersson L, Al-Jame Q. School teachers' knowledge of tooth avulsion and dental first aid before and after receiving information about avulsed teeth and replantation. *Dent Traumatol* 2008;24:43–9.
10. Andersson L, Al-Asfour A, Al-Jame Q. Knowledge of first-aid measures of avulsion and replantation of teeth: an interview of 221 Kuwaiti schoolchildren. *Dent Traumatol* 2006;22:57–65.
11. Ramos-Jorge J, Paiva SM, Tataounoff J, Pordeus IA, Marques LS, Ramos-Jorge ML. Impact of treated/untreated traumatic dental injuries on quality of life among Brazilian schoolchildren. *Dent Traumatol* 2014; 30:27–31.
12. Thelen DS, Trovik TA, Bårdsen A. Impact of traumatic dental injuries with unmet treatment need on daily life among Albanian adolescents: a case-control study. *Dent Traumatol* 2011;27:88–94.
13. Eilert-Petersson E, Andersson L, Sörensen S. Traumatic oral vs non-oral injuries. *Swed Dent J* 1997;21:55–68.

14. European Academy of Paediatric Dentistry. Guidelines on prevention of Early Childhood Caries: an EAPD policy document. Accessed February 2014. Available at: <http://www.eapd.gr/FEBF89FE.en.aspx>.
15. Caglar E, Kuvvetli S, Sandalli N. Safety of play equipment and surfaces for children in playgrounds in relation to dental trauma. *OHDMBSC* 2010; IX:63–8.
16. Eilert-Petersson E, Schelp L. An epidemiological study of bicycle-related injuries. *Accid Anal Prev* 1997;29:363–72.
17. Al-Jundi SH, Al-Waeili H, Khairalah K. Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma. *Dent Traumatol* 2005;21:183–7.
18. Zadik Y. Oral trauma and dental emergency management recommendations of first-aid textbooks and manuals. *Dent Traumatol* 2007;23:304–6.
19. Young C, Wong KY, Cheung LK. Effectiveness of educational poster on knowledge of emergency management of dental trauma-part 1. Cluster randomised controlled trial for primary and secondary school teachers. *PLoS ONE* 2013;8:e74833.
20. Eysenbach G, Diepgen TL. The role of e-health and consumer health informatics for evidence-based patient choice in the 21st century. *Clin Dermatol* 2001;19:11–7.

Supporting information

Additional supporting information may be found in the online version of this article at the publisher's website.